



Feedback between surface processes and rift-passive margin formation

Ritske S. Huismans (1), Philippe Steer (2), and Patience Cowie (1)

(1) Bergen University, Earth Sciences, Bergen, Norway (Ritske.Huismans@geo.uib.no), (2) Geosciences Rennes, University Rennes 1

We use new state of the art computational modeling techniques to model crust and lithosphere deformation coupled to surface processes in 2D and 3D. To date few 2D models exist that are able to bridge scales ranging from the lithosphere to sedimentary basin fill. Here we model in 2D the interaction of lithosphere deformation, high-resolution shear zone formation, and sedimentary basin fill. The models indicate a strong interaction and feedback between the structural style of deformation at crust and lithosphere scales and efficiency of sedimentary basin fill and rift flank erosion both in 2D and 3D. In 2D high deposition rates enhance rift localization and increase rift boundary fault offset. Rift flank erosion similarly enhance fault offset. We furthermore use large deformation 3D forward coupled tectonic-surface process modeling techniques to investigate the effect of surface process efficiency on rift linkage. The models indicate that the style of rift linkage in 3D is strongly controlled by fluvial surface process efficiency and by the amount of offset between pre-existing weakness zones.